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Research Paper

Analysis of monetary poverty in rural households in the DRCongo (Case of villages located on the Kisangani-Yangambi road)

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Summary
The aim of this study was to assess the level of monetary poverty of households using the F-G-T approach in rural areas of the DRC. The villages on the Kisangani-Yangambi road were included.
After our investigations, the results were as follows:
89.2% of households live below the poverty line.
Depth of poverty: 29.6%, the average gap between the poor and the poverty line.
For the severity of poverty, we have 16.2% as the average increase in consumption for there to be no more poor people in this community.
For socio-demographic results, we found that 62% of heads of household have secondary education, 96% can read and write, and 95% have agriculture as their main source of household income.
In terms of income, we found an average annual household income of USD 2729, or USD 0.9 per person per day.
For the relationship between socio-demographic profile and poverty, the results of the Chi-square test of dependence reveal that poverty is related to household size, level of education of household heads and main activity. In addition, the Cramer V coefficients calculated show that there is a strong link (0.180V0.360) between poverty and some socio-demographic profile parameters, including household size and level of education of the heads of households.

Keywords: *Analysis, income poverty, households, rural, DR Congo*

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I. INTRODUCTION

Poverty in DR Congo is characterised by disparities between rural and urban areas. Food insecurity and undernourishment affect more than 70% of the population, who are further weakened by the malaria and HIV/AIDS pandemics. This situation is a cause for concern and is leading to a rural exodus (Ministry of Agriculture, Fisheries and Livestock - Democratic Republic of Congo, 2009) in (Mokili et al, 2019).

The vast majority of the Congolese population is poor. In 1960, the average income of the population was US$480, falling to $80 in 2000, then rising again to reach $200 in 2009 (Musito, 2010). In 2014, DR Congo was among the countries with the lowest human development indicators in the world, with an HDI of 0.338 (Banque Centrale du Congo, 2014) and ranked 186th out of 187 countries (UNDP, 2015). The incidence of poverty, according to simulations carried out as part of the DSCRP-2 in 2011, was estimated at 70% (Ministry of Planning and Monitoring the Implementation of the Modernity Revolution et al, 2014.)

The Democratic Republic of Congo is facing an increasingly acute food deficit. Apart from other causes, this deficit is also due to a lack of investment in the agricultural sector, a shortage of agricultural inputs, almost no communication and evacuation routes for agricultural products, and the weak technical capacity of the various players. This state of affairs has led to massive imports of agricultural products such as cereals, frozen fish, frozen chicken and offal, etc. (DRC Ministry of Planning, 2011).

For more than half a century, the world's attention has been focused on a scourge that affects billions of people around the globe: poverty. Whether you are a sociologist, demographer, doctor or economist, it has now become unthinkable to ignore it or fail to allude to it in your reflections or studies (Nganda, 2011).

Generally speaking, when addressing the issue of poverty, the great temptation is to categorise the poor in order to count them, study how they live and analyse how their situation changes over time. Economists and statisticians have devoted countless studies to measuring poverty and attempting to determine the supposedly most appropriate methods for doing so (Paugam and Selz, 2005). On the other hand, research into the social representations of poverty is rarer. By social representation of poverty, we mean here the meaning that individuals give to this phenomenon as a function of their experiences and circumstances (Bolakonga, 2013).

So for an analysis of poverty, we need to take into account a large number of dimensions of poverty, reflected by different characteristics, while targeting individuals or households living in a precarious situation. These problems are real diseases for a country, which is why all governments are committed to fighting this scourge (Andrianarivao, 2013). Poverty in the Democratic Republic of Congo (DRC) has a number of facets, including low income, failure to meet food requirements, difficulty in accessing healthcare, schooling, decent housing, drinking water, etc. (Mokili, 2019).

Poverty affects seven out of ten households in rural areas in the DRC (DRC Ministry of Planning 2013). Of all the existing theories of poverty, a good government has to choose the one with the best results, i.e. the one that best explains the situation of its population. However, this choice is far from easy. One of the reasons for this is that it is difficult to have an adequate theory of poverty for a society, and therefore good policy is to find an approach to poverty assessment that reflects the reality of the community concerned.

Thus, as part of this research, we assessed household income poverty using the Foster-Greer-Thorbecke approach in rural areas of the DRC.

METHODOLOGICAL APPROACH

To achieve the objectives set for this study, i.e. to collect process and analyse the relevance of poverty indicators, a well-developed methodology is required. This section covers: survey materials, sample selection, specification of variables to be analysed, adoption of survey techniques and data analysis models.

Presentation of the study environment

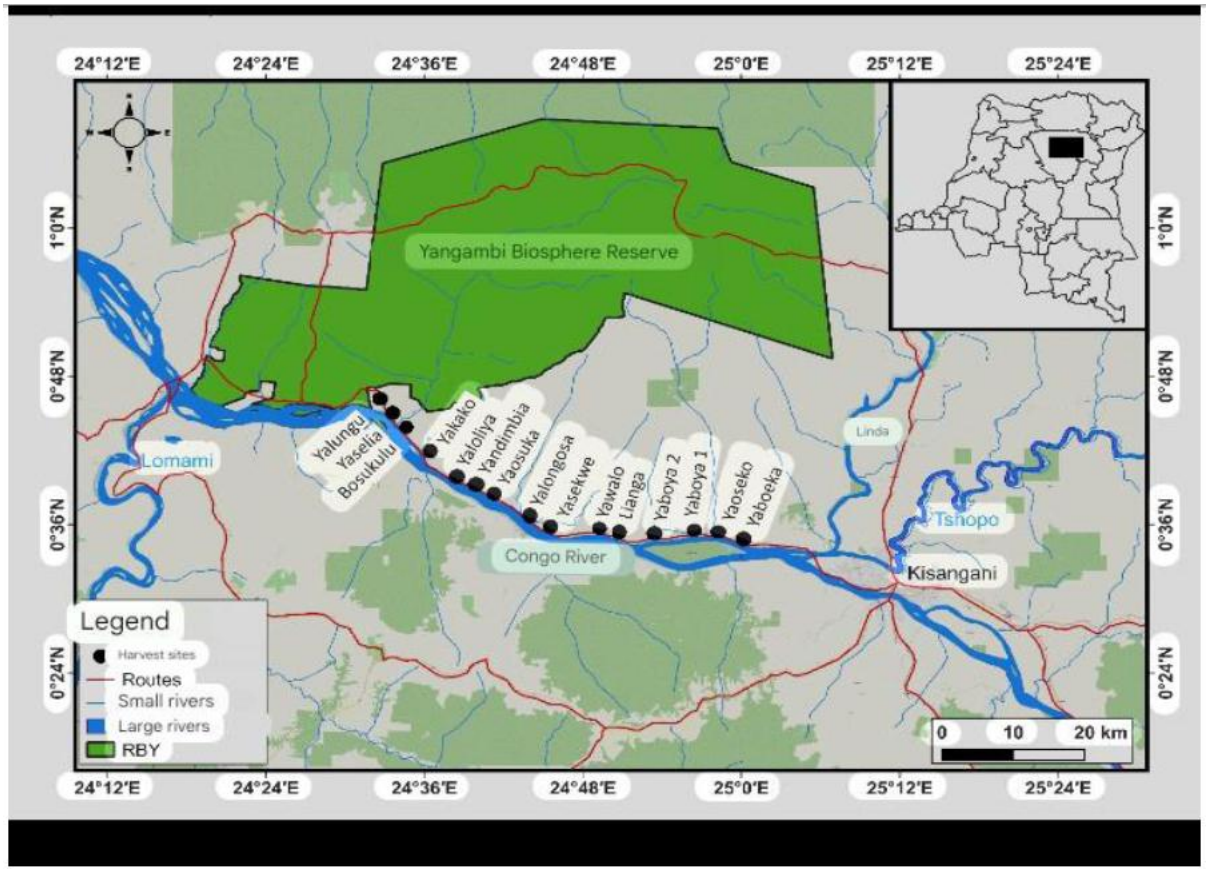
The villages on the Kisangani-Yangambi road represent our research site. They are located in the Territory of Isangi in the Turumbu sector, which includes 4 groups (Yawenda, Yelongo, Yambawu and Weko). The total area of the Turumbu sector is 3674 km2, with 55 villages and an estimated population of 83,251. The villages selected for our research on the Kisangani-Yangambi road are located in the two most densely populated groupings in the sector (Yawenda and Yelongo).

Yawenda has a total of 31 villages with an estimated population of 52100 inhabitants and Yalongo has a total of 10 villages with a population of approximately 20819 inhabitants.

The general climate of Isangi Territory is characterised by annual rainfall of between 1,800 mm and 2,000 mm, with two rainy seasons running from mid-March to June and from mid-August to mid-December. The average temperature is 24°C, with a maximum of 30°C and a minimum of 21°C. The absolute minimum temperature recorded is 18°C (CAID, 2017).

Secteur Turumbu in the Territory of Isangi is located in the agro-ecological zone of the central Congolese basin, characterised by an average altitude of between 200 and 500 metres above sea level. It has a dense hydrographic network dominated by the Congo and Lomami rivers. These waterways enable a large proportion of production to be transported to the centres of consumption.

The main soil groups found in Isangi Territory are Ferralsols and Ferrisols on undifferentiated rock, Yangambi-type plateau Ferralsols, Salonga-type arreno-ferralsols on sand and recent tropical soils. The latter, as well as the ferralsols, have average agricultural suitability. The regeneration capacity of cultivated soils is largely handicapped by the reduction in fallow periods and the rapid degradation of organic matter under local climatic conditions (high temperature and humidity). (Mokili, 2014).



Sampling

There are several sampling methods, the most commonly used in data collection being probabilistic and non-probabilistic methods. With probabilistic methods, the sample is extracted from the parent population at random according to a few rules. As for the non-probabilistic methods used in this research, the key element lies in the "reasoned choice" where, in order to collect data, we limit ourselves to a few characteristics on a small number of cases.

In the context of our research, the parent population is made up solely of rural households in the Democratic Republic of Congo in the Province of Tshopo (formerly the District of Tshopo) in villages located on the Kisangani-Yangambi road axis. This choice was motivated by the fact that several poverty reduction projects have been carried out on this axis, including the Prapo and Pradat projects. A sample of 102 households in 15 villages was taken.

For monetary poverty, we collected data on household income: gross agricultural household income, net agricultural income, total agricultural expenses, quantities of agricultural products, prices of agricultural products, self-consumption value of agricultural products, income from products other than agricultural products, livestock and fishing.

Data collection methods and techniques

Before carrying out the actual survey, we carried out a pre-survey which helped us to become familiar with the three axes of the chosen Sector, to determine the research site, and the number of villages and households that would ultimately be selected for the survey.

Statistical analysis

To decide or assess whether the indicators chosen for this study have had an impact on income poverty in the study area, we used statistical analysis. First, we carried out a univariate analysis of the qualitative and quantitative variables (mean and standard deviation). Next, a bivariate analysis was carried out to assess the level of relationships and links established between pairs of quantitative and qualitative variables (Student's t-test or Mann Whitney test and Chi-square) and (Cramer's V coefficient). The non-parametric Mann Whitney test would have been used if the conditions for using the parametric Student's t test were not met, i.e. :

Normal distribution:

Equality of variances: $\sigma 1 = \sigma 2$

Chi-square test

The Chi-square test is used to test the relationship between two qualitative variables. For the Chi-square test, if the p-value is greater than 0.05 the data are independent, otherwise they are dependent.

Cramer's V coefficient was used to test the relationship between two qualitative variables. If the Cramer V coefficient varies between 0.000 and 0.045, i.e. the link is very weak, between 0.045 and 0.090 the link is weak, between 0.090 and 0.180 the link is medium, between 0.180 and 0.360 the link is strong, and finally between 0.360 and 1 the link is very strong.

The SPSS, R and software packages were used respectively to enter, analyse, process and statistically analyse our socio-economic data.

Foster-Greer-Thorbecke approach

This is one of the most important approaches to poverty, widely used in empirical work and owing its popularity mainly to its simplicity (Moummi, 2010). It is for this reason that we have chosen this index to analyse poverty.

Its formula is as follows: $FGT_\alpha = \frac{1}{N}\sum_{i=1}^{H}\left(\frac{z-y_i}{z}\right)^\alpha$

Where

N: number of individuals

H: number of poor individuals

Z: poverty line yi: expenditure (income) per household α: aversion index (α = 0, 1, 2)

There are three possible cases depending on the value of α.

- If α = 0, we have FGT where Po. Po is the incidence or rate of poverty. This index measures the proportion of the population with a level of expenditure (or income) below the poverty line.
- If α = 1, we have the index P1, called the depth of poverty. This index measures the average gap between the poor and the poverty line.
- If α = 2, we have P2, the poverty severity index. P2 measures the intensity of poverty among the poor themselves.

The poverty line is the absolute level of income set by government and other research institutions below which an individual is considered to be poor. In Europe, this threshold represents 60% of a country's median income. It is defined as the possession of one Congolese franc or dollar for daily expenditure.

III. RESULTS

Annual agricultural production

Table 1 below shows the agricultural production of the fields cultivated by the households surveyed.

Table 1 Agricultural production of fields cultivated by surveyed households

	Field 1/ Tonne	**Field 2/ Tonne**	**Field 3/ Tonne**	**Total field production**
Sum	1648,8	122,618	6,12	1777,538
Average	16,16	1,20	0,06	17,43
Standard deviation	5,40	0,55	0,25	6,19

Source: our survey

Table 1 above shows that the average total production of the fields is 17.43 tonnes, with a variation of plus or minus 6.19 tonnes. This production is broken down as follows: 16.16 tonnes with a variation of plus or minus 5.40 tonnes for the first field specifically for cassava, followed by 1.2 tonnes with a variation of plus or minus 0.55 tonnes for the second field intended for cash crops such as maize, rice and, rarely, plantain, and finally 0.06 tonnes with a variation of plus or minus 0.25 tonnes for the third field intended for other cash crops such as celery or soya.

Analysis of these results reveals that the large difference in tonnage between the first and second fields is justified by the types of crop grown. Cassava is the main crop produced on a large scale for self-consumption and for sale throughout the year by the households surveyed to ensure daily nourishment and, finally, to combat poverty. In terms of tonnage per hectare, it has a much higher value than the other crops recorded in this research.

Main sources of income

Figure 2 below shows the main sources of income for the heads of the households surveyed.

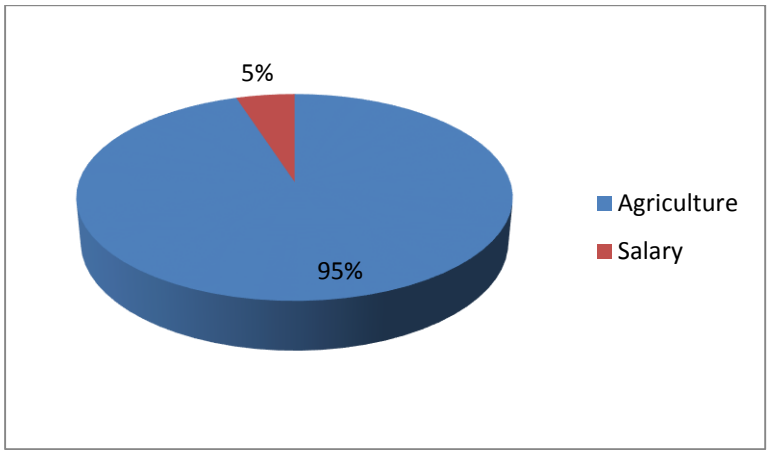


Figure 2: Sources of income for households surveyed

Analysis of Figure 2 above shows that 95% of respondents' main source of income is agriculture, and 5%'s main source of income is their salary. This analysis also shows that even households whose main source of income is wages are also involved in farming, and that their wages provide them with the financial support they need to hire labour for farming activities. These households have a significant annual income, but the size of their households is an enormous burden. This could make them poor beyond what they earn in income.

Household income

Table 2 below shows the income of the rural households surveyed.

Table 2 Income of rural households surveyed

	Household size	Household income in USD per year	Income per individual in USD per day
Sum	951	72385	90,4
Average	9	2729	0,9
Standard deviation	3	542	0,3

Source: Our calculations

Table 2 above shows an average household size of 9 people, with a variation of plus or minus 3 people. The average annual income per household is USD 2729, with a variation of plus or minus USD 542, which means that per day, the income per individual in a household is USD 0.9, with a variation of plus or minus USD 0.3.

It can be seen from these results that, according to the UNDP standard, "a person is considered poor if his or her minimum daily income is below $1.25" (UNDP, 2015). From the above, we can say that, on average, the households surveyed are in a situation of poverty.

Main household income allocations

Figure 3 below shows the main uses to which the income of the households surveyed is allocated.

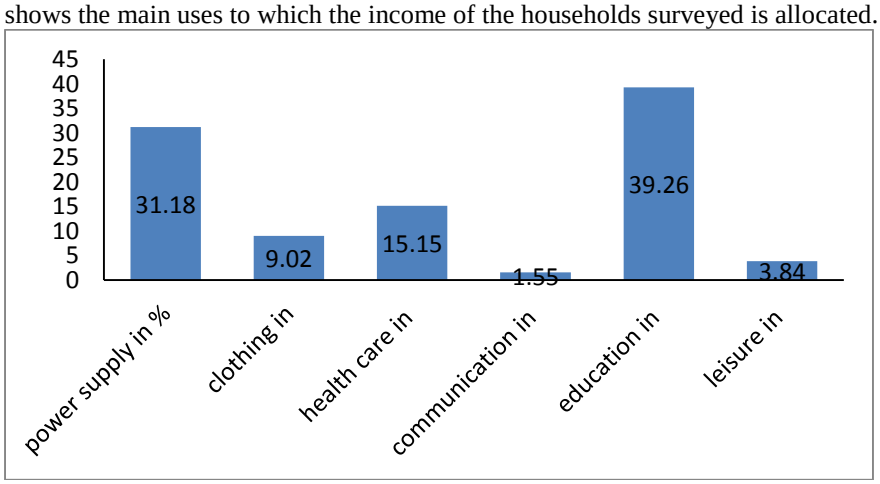


Figure 3: Main uses of surveyed households' income

The figure above shows that the highest proportion of income is spent on children's education (39.26%), followed by 31.18% on household food, 15.15% on household healthcare, 9.02% on household clothing, 3.84% on leisure and 1.55% on telephone calls.
This analysis also reveals that the low proportion for communication could be justified by the limited access or absence of telephone networks on the Kisangani - Yangambi road. This leads to poverty among the population due to limited access to the prices of agricultural products in the major shopping centres.

Monetary poverty using the F-G-T approach
Table 3 below shows the monetary poverty of the households surveyed on the basis of household income data using the F-G-T approach.

Table 3 Monetary poverty of households surveyed

Severe weight insufficiency	**Moderateponderal insufficiency**	**Weight insufficiency**
16,27	29,65	89,21

Source: Our calculations

- The malnutrition rate (underweight) is 89.21%, i.e. the poverty rate is 89.21%, which means that 89.21% of the population have an income below the poverty line.
  The rate of malnutrition (moderate underweight) is : 29.65%, i.e. the rate of the depth of poverty is 29.65%; which amounts to saying the average gap of the poor in relation to the poverty line is 29.65%. In other words, 29.65% of the average gap would have to be reduced to reach the poverty line, so that there would no longer be any poor people.
- The rate of malnutrition (severe underweight) is : 16.27%, i.e. the severity of poverty is 16.27%; which amounts to saying that the intensity of poverty among the poor themselves is 16.27%. In other words, an average increase in consumption of 16.27% would be needed for there to be no more poor people.

Relationship between socio-demographic profile and poverty
Gender of household heads and poverty
Table 4 below shows the level of dependence of poverty on the gender of heads of household.

Table 4: Poverty by gender of household heads.

Poverty situation			**Chi-square test**	Cramer's V coefficient
	Yes	No		
Men	83	8	p-value = 0.402	0.0471
Woman	9	3		
Total	91	11		

This analysis shows that poverty does not depend on the gender of the heads of households in the study area, with p-value = 0.402 and a weak link between the two variables, as the V of cramer is 0.0471.

Marital status of heads of household and poverty
Table 5 below shows the level of dependence of poverty on the marital status of households.

Table 5: Poverty in relation to the marital status of heads of household.

Poverty situation			Chi-square test size	Cramer's V coefficient
	Yes	No	p-value = 0,3561	0,112
Single	0	0		
Married	89	10		
Widowed	2	1		
Total	91	11		

This analysis reveals, with p-value = 0.3561 which is greater than 0.05, that the two variables are not dependent with a medium link, since V de cramer is equal to 0.112. This means that poverty in our study area does not depend on the marital status of the heads of households. This means that poverty in our study area does not depend on the marital status of the heads of household.

Household size and poverty

Table 6 below shows the level of dependence of poverty on household size.

Poverty situation			Chi-square test size	Cramer's V coefficient
	Yes	No		
1 to 5 people	1	9	p-value = 0.00419	0.263
6 to 10 people	54	2		
11 to 11 people	33	0		
More than 15 people	3	0		
Total	91	11		

The result of this analysis shows that household monetary poverty is strongly influenced by household size, with p-value = 0.00419, which is less than 0.05. This means that the two variables are dependent and the link is strong, since V de cramer is equal to 0.263. This shows that rural households with a large number of members do not have to rely solely on monetary income to meet their day-to-day needs.

Level of education of heads of household and poverty

Table 7 below shows the level of dependence of poverty on the level of education of heads of household.

Table 7: Poverty in relation to level of education of heads of household.

Poverty situation			Chi-square test size	Cramer's V coefficient
	Yes	No		
No level	1	0	p-value = 0.04467	0.194
Primary	36	1		
Secondary	52	10		
University/sup	2	0		
Total	91	11		

Analysis of table 7 above shows that poverty in rural areas depends on the level of education of the heads of household, with p-value = 0.04467 which is less than 0.05. The link between the two variables is strong with V of cramer is 0.194. This shows that the level of education of the heads of households has a strong influence on the development of their households.

Main activity and poverty

Table 8 below shows the level of dependence of poverty on the main activity of heads of household.

Table 8: Poverty in relation to the main activity of heads

Poverty situation			Chi-square test size	Cramer's V coefficient
	Yes	No	p-value = 0.0317	0.0881
Agriculture	87	10		
Salary	4	1		
Total	91	11		

The comparative analysis of poverty in relation to the main activity of the heads of households reveals a level of dependence with p-value = 0.0317, but the link of this dependence is weak with V of cramer of 0.088. This means that agriculture is the main source of income, but it is supported by other sources of income that are not controlled by the household, as the linkage was found to be weak.

This is one reason why the F-G-T approach is ill-suited to the context of rural Congo, insofar as it assesses household poverty on the basis of monetary income alone.

DISCUSSION

The various studies carried out in rural areas of the DRC were relevant in their design to assess the monetary poverty situation of households, but the variations in the results make them only partially relevant to the context of rural Congo.

In this study, the results of the assessment of monetary poverty using the F-G-T approach show that 89.2% of households are in a situation of poverty. This high rate of poor households can be explained by certain difficulties encountered by this approach in assessing household income in the context of the DRC's rural environment, with its diversity of resources and culture of mutual aid.

For the depth of poverty, the F-G-T approach presents 29.6% as the average gap between the poor and the poverty line.

For the severity of poverty, with F-G-T we have 16.2% as the average increase in consumption for there to be no more poor people.

Our socio-demographic results compared to other research, we found that 62% of heads of households are at secondary level, 96% can read and write, 95% have agriculture as their main source of household income. These results compared to other studies, Nganda, 2011 in his study conducted the result shows that 48% of heads of households are secondary level, 75% have agriculture as their main source of income; Mokili, 2019 in his study it shows that 81.3% are secondary level, 67.2% can read and write; Bolakonga, 2013 in his study it shows that 45% of heads of households are secondary level and Mpanzu, 2012 in his study it shows that 67% of heads of households have secondary level, 94% have agriculture as their source of income. This shows a level of collaboration in the socio-demographic profile of rural areas.

An analysis of household poverty revealed that 89.2% of households were living in poverty. These results, compared with those found by Moummi, 2010 in his study, show that the Congolese rural environment has a rural poverty rate of 72% compared with 59% for the urban environment, and Andrianarivao, 2013 in his study, also shows that between 79% and 86% of farming households are classified as poor in Madagascar.

Analysis of this situation leads us to question the effectiveness of monetary poverty indicators in the context of the Congolese rural environment for a number of reasons, including the fact that rural areas are poorer than urban areas, under-valuation of the subsistence farming system in monetary terms, most of which is self-consumed, other sources of income that are uncontrolled and under-valued, etc., and poor governance with an informal rural economy.

In terms of income, we found an average annual household income of USD 2729, or USD 0.9 per person per day. Compared to other studies, this result corroborates with those of Nganda, 2011 which is 0.99 USD per individual per day; Mokili, 2019 found 0.147 USD per individual per day for non-beneficiaries of the project and 0.158 USD for beneficiaries of the PRODAT-CTB project, 2016 and 0.80 USD by IFAD, 2014. In terms of household income, we found an average of USD 2727 per household. This result compared to other studies, Bolakonga, 2013 in his study, he found an average agricultural income per household of 732.8 USD.

These results only partially reflect the sources of household income, because in the context of the Congolese rural environment, household monetary income is not sufficient to determine household consumption.

For the relationship between socio-demographic profile and poverty, the results of the Chi-square test of dependence reveal that poverty is linked with household size, level of education of household heads and main activity. Furthermore, the Cramer V coefficients calculated show that there is a strong link (0.180V0.360) between poverty and a number of socio-demographic profile parameters, including household size and level of education of the heads of households.

These results corroborate those of Mbaye, 2010, who found that households of more than 10 people often have problems feeding their children. The relationship is established at a significance level of 1% and the level of education of the heads of households influences the level of household poverty with 32.11% having no education, 27.86% primary education, 30.77% secondary education and 0% university education.

Moummi, 2010 found, 80% of households live in poverty, when the number of individuals exceeds five, this shows that the size of households is an aggravating factor of monetary poverty in the DRC and Bouwe, 2022 in his socio-economic analysis, he states that the level of education increases the ability to produce good ideas transformative of the psychological and socio-economic environment for national and local promotion, by putting them into practice.

However, this poverty is not a function of the gender and marital status of the heads of household, and the Cramer V coefficients calculated show that this link is weak (0.045V0.090) for the gender of the heads of household and average (0.090V0.180) for the marital status of the heads of household.

CONCLUSION

The aim of this study was to assess the level of household monetary poverty using the F-G-T approach in rural areas of the DRC.

After our investigations, the results show that :

For monetary poverty, 89.2% of households are in a situation of poverty.

For the depth of poverty, the F-G-T approach shows 29.6% as the average gap between the poor and the poverty line.

For the severity of poverty, with F-G-T we have 16.2% as the average increase in consumption for there to be no more poor people.

Our socio-demographic results compared with other research show that 62% of heads of household have secondary education, 96% can read and write, and 95% have agriculture as their main source of household income.

In terms of income, we found an average annual household income of USD 2729, or USD 0.9 per person per day.

For the relationship between socio-demographic profile and poverty, the results of the Chi-square test of dependence reveal that poverty is linked with household size, level of education of household heads and main activity. In addition, the Cramer V coefficients calculated show that this link is strong (0.180V0.360) between poverty and some socio-demographic profile parameters, including household size and level of education of the heads of households.

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